BIRD-WATCHING AND BIOLOGICAL SCIENCE.

SOME OBSERVATIONS ON THE STUDY OF COURTSHIP IN BIRDS.

BY JULIAN S. HUXLEY, B.A.

(*Concluded from p. 161.*)

Now let us consider a few practical suggestions.

To begin with, the most valuable data are those secured through continuous watching. Choose a single species of bird breeding in a single locality, and resolve to get at the bottom of its life-history. This will mean visiting the place at least two or three times a week, (oftener if possible); make the visits as soon after sunrise as you can, for it is then that almost all diurnal birds show their greatest activity. If this is impracticable, then the middle of the morning is the next best time, and the late afternoon next. The heat of the day is usually poor. If you can be sure of the same pair time after time, so much the better. Anyhow, be resolved at each visit to follow out the behavior of individual pairs or birds for the longest possible period. After you have obtained a general rough idea of the various actions performed by the species, you will find it infinitely better, if you wish to get at their real meaning and connection, to keep your attention on a single bird or pair (even if this involves long spells of apparently useless watching, during periods of rest or feeding), than to jump from one individual to another whenever something exciting happens. This I can personally testify to be of the greatest importance.

Full notes should always be made, and should be made at the moment, or as soon after as possible, if they are not to lose half their value. Every week it is useful to go through your notes and make a little summary to see what new points have been gained, or on what you should especially concentrate during the week to come. A big scribbling pad is better than any bound notebook, as its use permits of the subsequent rearrangement of notes for filing.

Besides the one (or at most two) species you may choose for

thorough investigation in any one year, other birds will constantly be bringing interesting points to your notice. These should, of course, all be put on record. I have tried various methods, and have at last come to regard the card-index and folder system as by far the most convenient. Have a card-index drawer of $3'' \times 5''$ or, preferably, $4'' \times 6''$ cards. Each species on which you have notes is to have its own place; the species should be arranged in some definite classificatory order, preferably that of the A. O. U. Check-List, with guide-cards for the families, and possibly others of another color for the genera. Or the genera and species can be arranged alphabetically within the limits of the family. On the cards belonging to each species your field notes should be summarized very briefly under various headings. I recommend the following sub-division as one affording easy reference: —

(a) Autumn and Winter habits.
(b) Actions connected with the beginning of the breeding season (*i. e.* in monogamous birds, pairing-up habits).
(c) Courtship and Display (including Song).
(d) Fighting, and actions connected with Jealousy (including questions of Territory).
(e) Nest-building, Egg-laying, and associated actions.
(f) Incubation and care of the young.
(g) General Miscellaneous notes, including localities, identification, call-notes, etc.

A few remarks on the scope of these subdivisions will, I think, be useful; perhaps the best way is to put a set of questions which must be answered for any species before we can consider ourselves in possession of its full annual history. I will take the headings in their order.

(a) *Autumn and Winter habits:* (1) Is the *individual, pair, family, flock,* or *composite flock* the unit? (Examples: In the Redbreast, *Erithacus rubecula,* the birds are solitary all through the winter; in early autumn the old birds and the full-grown young have fierce fights. This is due to the fact that the birds are non-migratory and in winter each requires a definite territory to support life. By *composite flock* I mean a flock composed of two or more species. For instance, in Europe Rooks and Jackdaws often feed together, and the small woodland non-migratory birds often band

together into flocks containing four or five species. I have seen three species of Paridæ (*P. major*, *P. cæruleus* and *P. ater*) together with Goldcrests (*Regulus cristatus*) and Creepers (*Certhia familiaris*) all travelling together through the tree-tops.)

(2) If the flock is the unit, does the pair persist within the flock? (*cf.* the Dabchick, cited above, p. 149). In some birds this is definitely not the case, since the sexes separate and the flocks are almost all of one sex: e. g. *Fringilla cælebs*, the Chaffinch.)

(3) In migratory birds, is the unit the same all through these months, or do the migrating flocks break up into pairs or individuals in their winter home?

(4) Is there any recrudescence of courtship-action in early fall, or in warm days in winter? (After family duties are over and before there is any scarcity of food, many birds go through a modified form of courtship. I have seen a pair of Kingfishers (*Alcedo ispida*) in October, in England, very obviously "courting." It would be of great interest to know in what ways the courtship of autumn differs from the typical courtship. A warm day in late winter often seems to arouse the dormant sexual actions, just as it induces a first attempt at song. This January I saw a Hermit Thrush, though quite alone, several times go through the motions of depressing the tail and drooping and spreading the wings, which on the one hand are the regular motions accompanying coition, and secondly have afforded the basis (by association of ideas) for a large number of the beautiful ceremonies of display.)

(b) *Actions connected with the beginning of the breeding season:* (1) Is the species polygamous, polyandrous, promiscuous, or monogamous? If the last, does it pair for the season, or for life? (This question must be answered first, for naturally all the courtship will stand in relation to the answer to it. One very important point is the numerical proportion of the sexes. In some of the Game-birds it appears that there may be a large excess of males, but in most species the numbers are pretty equal. It is obvious that this point will have an important bearing on courtship, and it figures prominently in discussions of the Sexual Selection theory.)

(2) In those birds that are not monogamous, what actions initiate the breeding season? (very little is known on this point.)

(3) In monogamous birds, what is the date of pairing-up?

And what relation does it have to migration in migratory species? (In the Killdeer it appears to take place before migration (see below), while in the migratory species of Old-world Warblers (Sylviidæ) it begins, as is well-known, after migration. See Eliot Howard ('07) for details on this point.)

(4) What is the mechanism, so to speak, of pairing-up? Is force used by the cock to the hen? (I do not think any cases of this are known.) Are there fights between cocks or between hens for the privilege of staying in the proximity of the bird of the opposite sex, who meanwhile is comparatively passive (the males of Mocking-birds and Thrushes seem to do this, and possibly the females too; Eliot Howard records many cases of such fighting among hens in the Sylviidæ). Does the cock chase the desired hens until one consents to receive his advances? (This seems to be a very general method. It holds in many Ducks, probably in the Grebe, and in such species as the Killdeer, to speak only from my own experience.) Are there any special displays or other ceremonies associated with pairing-up, or does courtship in the sense of definite ceremonies only begin later? (It appears that the latter is frequently true. On this point compare what happens in Man; before some agreement is reached, courtship is merely a series of approaches; it is only later that a purely objective observer, from Mars or elsewhere, would be able to record the existence of definite "ceremonies." On the other hand, the period of "approach" is characterized by a certain amount of "display-action" — attention to dress, showing-off of prowess, etc.— and in birds too there must exist something of the sort. The best-known example is the song of the migratory Sylviidæ in Europe, where the males, who have migrated some days before the females, attract their mates by singing. It will be of great interest to see whether other birds show the same sort of display, only appealing to the eye instead of the ear.)

(c) *Courtship & Display:* (1) *Song:* What are its dates of starting and stopping, and its relation to other activities? (In the Nightingale the song of the male ceases immediately the young are hatched, while the Song Thrush (*Turdus musicus*) sings nine or ten months of the year). Do both sexes sing? and if so, are the songs alike? (In the Cardinal the hens certainly sing, but not so well as the cocks.)

(2) *Courtship-action:* What are their details? Are they alike or not in the two sexes? (Great accuracy is needed, not merely in describing the different displays, but still more in following the sequence of events, and so analyzing the birds' mental states.)

(3) Are there special *structures* brought into action by courtship? (Peacock, Crested Grebe.) If no special structures, are there special *colors* only brought into prominence at courtship? (The Redshank (Huxley, '12) by its actions during display brings into notice the red of its legs, and the white of its tail and of the under surface of its wings, which are usually hidden. The Fulmar and the Kittiwake[1] have the inside of the mouth colored "delicate mauvy-blue" in the one case, "lurid orange-red" in the other (I quote from Selous, '05, pp. 123, 126). This "interior decoration" is displayed in a form of Mutual Courtship. The Ruby-crowned Kinglet gives a very interesting intermediate stage between structure-plus-color and color alone. The crown-feathers are ruby-red and slightly elongated; but the feathers on either side are so inserted as to cover over the bright patch in normal conditions. Only in moments of excitement is the red revealed; and the effect on the hen of such sudden flashing of the brilliant bit of color must be very great.)

Are there neither special structures nor special colors, but only special *actions* of courtship? (This is apparently the case in most of the Sylviidæ. All observations on similar birds will be of great interest, as in such cases courtship is at its most primitive.)

(4) Is there a long period of "engagement" or does coition take place immediately after pairing-up? (The latter seems to be true *e. g.* in the Sylviidæ; the former in many birds, such as the Crested Grebe, the Paridæ, etc. Facts are sorely needed on this point.)

(5) What is the relation of the courtship-actions to coition? (In *e. g.* the Blackcock and Redshank the one is an immediate preliminary and pre-requisite to the other, while in the Crested Grebe there is no direct connection at all, the courtship is "self-exhausting," and special ceremonies of an entirely different nature have been developed in relation to coition.)

(d) *Fighting and Jealousy:* (1) Is the fighting between males

[1] *Fulmarus glacialus* and *Rissa tridactyla.*

fierce and genuine? (Tits, Thrushes, Mocking-birds) or is it degenerate, one might almost say merely symbolic? (Blackcock, Redshank, etc. Selous ('09) has some interesting remarks on this point.)

(2) Is there fighting between females? (Sylviidæ; and I have seen a chase between two female Nighthawks lasting for over thirty minutes.)

(3) How much of the fighting is due to mere sex-passion, and how much to jealousy proper? In other words, is it directed blindly against all others of the same sex, or definitely against a single intruder who is tampering with the mate's affections? (In the Grebe, jealousy is very strongly developed. We should expect to find jealousy where there is monogamy and mutual courtship. A special form of jealousy is seen in the Blackcock (Selous, '09) where the sight of a hen crouching to a cock rouses the anger of all the other cocks, who immediately rush at the successful suitor. Fighting due to mere sex-passion is seen in many Mammals, in such birds as fight previous to pairing-up, and in the ceremonial fights of such polygamists as the Blackcock.)

(4) Does jealousy modify the courtship-actions? (In the Crested Grebe, "Shaking" between the members of a pair after a flirtation by one of them, is of a special type.)

(e) *Nest-building, Egg-laying, etc.:* (1) Do both sexes share in nest-building, or not? If so, do they share equally?

(2) How long does it take to build the nest?

(3) How many nests are built? (The Grebe builds two or three, the European Wren (*Troglodytes parvulus*) and the American Magpie (*Pica p. hudsonia*) often four or five.)

(4) Is there more than one kind of nest? (The Bower of the Bower-bird of Australia is probably a modified nest, while the pairing-platform of the Crested Grebe is undoubtedly so.)

(5) Is there any form of courtship specially connected with nest-building? (Many birds during courtship carry leaves, twigs and other nest-materials in their beaks — *e. g.* Sylviidæ, Crested Grebe. Others that nest on the ground have displays in which kicking and scraping the earth, pressing or rolling the breast on the earth play a part (*e. g.* the Ostrich, and the Peewit (*Vanellus cristatus*); see Selous, '01.)

(6) Does either courtship or coition go on after the laying of the first egg, or all the eggs? (We would expect both to go on till all are laid, but not many facts have been collected on this head.)

(f) *Incubation and Care of the Young:* (1) Do both sexes share in incubation? and if they share, do they share equally? (It is interesting to find the cocks of some species with marked sexual dimorphism sharing the duties of incubation; *e. g.* Ostrich, Blackcap (*Sylvia atricapilla*). This latter, in addition to possessing a black head distinguishing him from the brown-capped hen, is one of the four or five best European songsters, and is reported by many authorities to sing while actually brooding the eggs! In some cases where the sexes share, the cock takes less of the duty, *e. g.* a friend has told me that in case of danger near the nest, the cock Crested Grebe will not go and sit himself, but yet will attempt to drive the hen back.)

(2) Do both sexes share in feeding the young? and if so, do they share equally? (Here too we get indications that the male's assistance is a comparatively recent development of evolution. He is often not quite so bold or assiduous as the female. Old Colonel Montagu brought a Goldcrest's nest from its natural situation, first on to his window-ledge, and then into his room; the male had continued to help feed the young while the nest was on the outside of the window, but refused ever to enter the room; but the hen remained as assiduous as ever, and succeeded in rearing the brood.)

(g) *General Miscellaneous Notes:* Nothing much need be said on this head. It is always well to remember that some actions of birds seem to be gone through simply for the sake of releasing energy in a pleasurable way, simply because the bird enjoys doing them. Gulls, for instance, in early Spring fly round in aërial evolutions, now solitary, now social; I have seen Wagtails (*Motacilla lugubris*) in bright days in Autumn dart and run over the lawn and sing as if possessed. In neither case was there the least connection with courtship. In addition, some actions which have been developed in evolution as part of courtship may be used to liberate energy thus pleasurably (*cf.* from a similar point of view, children singing and dancing when they are happy. They may do it spontaneously, and then the sound or motion will be haphazard; but if they have

been taught particular songs or dances, they will almost certainly reproduce some phrases or motions of these. What they have learned thus serves as a channel through which the emotion can be liberated.) As examples of this in birds, we may take the song of those species, like the common European Thrush (*Turdus musicus*) or the Redbreast (*Erithacus rubecula*), which continue singing almost or quite through the winter. The aërial tumblings of Ravens, Curlews, Herons and other birds should also probably be included here.

If desired, other headings can of course be added, on such topics as food-habits, migration, etc. One interesting point that has not received much attention is the variation of habits in varieties of a single species; *e. g.* the different songs of the Eastern and Western Meadowlark (*Sturnella magna* and *S. neglecta*). In Europe I have noticed that the Marsh Tit (*Parus palustris*) has a long and quite musical song on the Continent, while in England it restricts itself to call-notes.

The best method for keeping the actual field notes is to file them in folders. Each folder has a number corresponding to the number of the species in the card-index. The numbers used in the A. O. U. Check-list may be used with advantage. In the folder the notes had best be dated and arranged chronologically, and reference from the cards to the notes will then be by date.

Let me take a concrete case. In February of this year I have been seeing a little of the earliest pairing-up habits of the Killdeer. While the birds are still in flocks, and the majority of them still far south of their breeding-places, this process is already beginning. Most of the flocks are simply feeding and resting unconcernedly as they have been doing all winter; but here and there one bird will be seen flying up close to another, who in turn will usually take wing and fly off, often to be pursued two or three times. A still smaller proportion of the flock seems to be already paired, and may be seen going through a ceremony together; I have not yet quite got the details of this, but both birds seem to participate, walking round and round each other in a strange formal way with heads pointing in opposite directions and necks straightened stiffly out, at the same time uttering a curious soft note. In passing, I may say that the Killdeer should be a good species in which to study

pairing-up. Personally I believe that the above facts should be interpreted thus — that the cocks fly up to the hens, either indiscriminately, or more probably, I believe, to those they unconsciously prefer; the hens in their turn either do not feel drawn to the suitors, in which case they reject them by repeatedly flying away, or else they are in their turn attracted by one of the cocks. This attraction depends on three factors; — (i.) the physiological state of the hen; (ii.) the instinctive mental (psychic) preference felt by the female for particular males, which must exist in birds as well as it obviously does in Man, though perhaps in different degree; (iii.) the persistence of the cock, which will tend to win the hen if she is doubtful but not unfavorably inclined, although it will make her more obstinate if she is repugnant from the first.

Once a hen consents to let a cock come right up, the next step is not coition, of which there is no question for many weeks, but this mutual courtship-action which to me appears as the link binding the pair together before the time of fertilization and nest-building. Be this interpretation as it may (and I confess that there are many little gaps yet to be bridged over), I yet have some definite facts, and they are filed as follows.

In the card-index the Killdeer (*Oxyechus vociferus*) comes under the family *Charadriidæ*, with the A. O. U. number 273. In my vertical file is a folder labelled 273 Killdeer. In this are my notes, under dates Feb. 7, 15 and Feb. 21, 15. In the card-index after the card of the species follows a card labelled (a) with the remark "common in small flocks throughout winter, Houston." Then one labelled (b), on which is written;

Approach flights of ♂	Feb. 7, 15.	Feb. 21, 15
Chase of ♀ by ♂	Feb. 7, 15.	Feb. 21, 15
Chase repeated twice	Feb. 21, 15	
Some birds paired	Feb. 7, 15	
Paired birds going through a ceremony	Feb. 7, 15	

When I have some more data, I shall go through all my facts and write a short summary of the pairing-up on another card which will also bear the heading (b).

The general system is now clear; it can be easily modified to suit anybody's ideas. Its chief advantages are ease of reference,

and the way in which facts under various headings can be summarized as they accumulate.

I intend to go on collecting data on courtship of birds for a number of years, and will be very grateful if other watchers will send me facts. Of course fragmentary details are not of much value, and in the case of diary notes made on the spot, a short summary under various headings will enormously reduce the labor involved in digesting the notes.

Before I close I would like to mention a few problems that have occurred to me during the short time I have been in America — problems that would be far better attacked by a number of watchers.

In the first place the whole conception of mutual courtship is new, and has to be worked out in detail. As definite problems here, I would suggest the following.

(1) What is the course of events in the Meadowlark, a bird with marked protective coloration above, and with its tail showing recognition marks, but with brilliant and probably sexual coloration on the breast, which is equally developed in both sexes?

(2) What is the meaning of the duets which only a few weeks ago I heard performed by the Barred Owl (*Strix varia*)? One performer gave a variation of the regular hooting, while the other rendered the same musical phrase, but in tones of demoniacal laughter, and alternating its notes with those of its mate. Bendire has a note on this remarkable habit.

In what was probably the Short-eared Owl I have seen remarkable "bowing duets," the birds curtseying to each other in exaggerated fashion. In the Dabchick, the vocal duet is the most prominent feature of courtship, taking the place of the head-shaking of the Great Crested Grebe.

(3) In a single group, like the Sparrows, we find very different gradations of sexual coloration. What is the difference between the courtship of such species as the Chipping Sparrow, the Lark Sparrow, the English Sparrow, and the White-throated Sparrow? In the first two, both sexes are alike, but the first species is sober-colored, the second distinctly gay; the last two show sexual dimorphism in varying degree. Still other species could equally well be chosen for the study.

(4) In the Woodpeckers, both sexes are usually fairly brilliant,

but the male is often distinguished by a very small patch of red on the head. To correlate this with courtship-habits would in itself be interesting; and still more so would be to compare the courtship of the average Woodpecker with that of the Red-Headed Woodpecker, where both sexes are in the first place similar, and in the second place brilliantly colored.

(5) Various similar interesting comparisons within groups can be made. *E. g.* between the Robin and the various Thrushes; or between the sexually dimorphic Ducks and the sexually similar Geese and Swans.

(6) The whole family of Grebes (Podicipidæ) is one in which very interesting results will be forthcoming. There is every variety in the degree of ornament while the sexes are on the whole very similar. For instance, in the Dabchick and the Pied-billed Grebe there is very little ornament, and in the Dabchick at least the mutual displays are largely vocal. In the Great Crested Grebe and the Horned Grebe there is a great deal of ornament accompanied, in the former species at least, by elaborate mutual ceremonies.

(7) In most sea-birds mutual courtship seems to be the rule. From my own unpublished observations it seems to be at its most primitive and unspecialized among the Gulls.

Selous ('05) has some interesting notes on Guillemots, Fulmars and Kittiwakes.

The Puffin (*Fratercula arctica*) in which during the breeding-season the bill *in both sexes* enlarges enormously and becomes brilliantly colored, will undoubtedly furnish interesting data; I recommend it to all those who love the grotesque.

(8) Finally, the Heron family is extremely interesting. In it the sexes always resemble each other; but while the Bitterns are on the whole sober and unornamented, we get crests and breast-plumes in such forms as the Louisiana and the Great Blue Heron, and most elaborate and often exquisite ornaments in species like the Reddish Egret, the Snowy Heron, and the ill-starred American Egret. I have absolutely no doubt in prophesying that these latter birds will show most elaborate and beautiful mutual dances and displays.[1]

[1] Since the above was written, I have had the opportunity to study the courtship of the Snowy Egret and Louisiana Heron on Mr. McIlhenny's remarkable Heron-pond in Louisiana. The results, though shortly to be published *in extenso*, are worth brief mention here.

Besides Mutual Courtship, another interesting subject is that of social gatherings at pairing-time. I had a little opportunity of seeing the gatherings of the Blue Jay last spring in Georgia, and it seemed to me that the gatherings resembled our dances in one respect — in that they "gave opportunities for the young men and women to meet each other." I should welcome all notes on this subject. The Flicker also has gatherings in early spring. As early as February 20th of this year I saw a gathering of ten or twelve in a large tree, but was unable to see anything of what was going on.

The Swifts and Swallows might prove interesting, especially the former, with their aërial chases of an evening. They are said, apparently on good authority, even to perform the act of pairing in mid-air.

Next comes another set of interesting problems — those of the reversal of the usual habits and duties of the sexes. The Phalaropes are the classic instance of this, and would well bear re-investigation. On the other hand, all the Hawks and Falcons show it to some extent, and in some ways would more repay watching, since in them the process is still in its early stages. Here, from what few facts are known, it seems that there may be a regular Darwinian courtship by the cock; this, in these aërial lords, takes the form of a series of wonderful display-flights. In the Kestrel (*Falco tinnunculus*) I myself have witnessed a cock time after time

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As I prophesied in this paper, there is a marked "mutual courtship," though not of quite such an elaborate nature as I had expected from my experience with the Crested Grebe. The most interesting thing about it, perhaps, is the fact that there is a regular honeymoon of two or three days, during which the pair sit together on the nest-site they have just chosen, and, without attempting to start building, are content with running their bills through each other's aigrettes, huddling close up to each other, and now and again giving a burst of quite elaborate mutual display — neck raised, wings drooped, and feathers bristled. After this honeymoon, the mutual displays go on, not merely throughout the period of nest-building, taking place whenever a stick is brought to the nest by one bird, to be laid by the other; but right through the time of incubation and care of the young, occurring whenever one bird relieves the other on the nest.

But at the very beginning, before pairing-up occurs, there appears to be a pure Darwinian courtship, the males showing off their plumage in a special display to the females, who on their part do not use their plumes in display at all until after they are paired up. Thus we get Darwinian display before pairing, and Mutual display after pairing — a state of affairs to me at least entirely unexpected, but showing once more how important are the very earliest manifestations of courtship — the pairing-up habits — and how essential it is to follow the course of events in any one species of bird throughout the whole of the season.

come swooping down the wind straight at the hen (who was perched on a bough), swerving high into the air when barely a yard from her; sometimes he would swing up so close to her that she would start back fluttering so as not to fall off her perch. A friend who knows the Peregrine Falcon in the Welsh mountains tells me that similar but even more startling evolutions are performed by the cock in this species. On the other hand, when it comes to incubation and the feeding of the young, it is the large and strong female who apparently usurps most of the ordinary duties of the male, for she does most of the catching of prey, while he sits longer on the eggs and young (see Heatherly, '13). It is obvious that observations here will be of interest.

In the Belted Kingfisher, the hen has a chestnut breast-band, which is absent in the cock. Here the female would appear to be the brighter, and investigation of the courtship, with this in mind, might be of value.

Finally I would suggest that the nuptial habits of the Turkey Buzzard and Black Vulture would be interesting from a quite special point of view. It is either an obvious, or else a startling fact, according to your point of view, to find that the lower animals have on the whole the same basis of æsthetic standards as ourselves. This is shown, for instance, by the preponderance of colors and forms that are agreeable to *us* in the courtship-structures of birds and other animals, or by the fact that flowers attract bees and butterflies by means of colors and scents that we too find beautiful or pleasant. On the other hand, some flowers rely for their fertilization upon carrion-feeding flies, and the colors they have developed are lurid yellows or fleshy pinks, with odors that are strong and often disagreeable (to us). (See Weismann, the Evolution Theory.)

The American Vultures too are carrion-feeders; such "ornaments" as they possess — the naked colored skin of the head, and the frill of feathers round the neck, are, although striking enough, yet hideous to our eyes. It would be a further notable piece of evidence in favor of Professor Washburn's idea of the animal mind, a further corroboration of the idea that there are spiritual as well as material natural laws underlying biological facts, if it were found that the courtship-action of these scavengers lacked all the normal grace of birds' love-making, and were to our eyes as

repulsive as their food is to our noses and their feeding-habits to our ideas.

In conclusion, I would like to thank 'The Auk' for so courteously extending its pages to me; I hope that these notes and suggestions may do something of what I intended they should do — I hope that they will show that bird-watching is the foundation of a real science, the science of the behavior of birds in their natural environment. Bird-watching, too, is in itself a sport, as all who have tried it well know; but those who attempt to understand the motives of the birds, the connection of their doings and the origin of their various habits, will find themselves not only experiencing the sportsman's thrill, but also the intellectual interest of the detective piecing together the broken chain of evidence, and the human feelings of a spectator at the play.

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Houston, Texas.
October, 1915.

ERRATUM p. 146, line 1, for Toucans read Hornbills.

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ANATIDÆ OF SOUTH GEORGIA.

BY ROBERT CUSHMAN MURPHY.

Plate XIV.

THIS paper is the twelfth [1] dealing with the ornithological results of the South Georgia Expedition of the Brooklyn Museum and the American Museum of Natural History.

Nettion georgicum (Gmel.)

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[1] A list of the preceding papers, not including several brief notes, follows: (1) Preliminary Description of a New Petrel, 'The Auk,' 1914, 12, 13; (2) A Flock of Tubinares, 'The Ibis,' 1914, 317–319; (3) Observations on Birds of the South Atlantic, 'The Auk,' 1914, 439–457; (4) A Review of the Genus *Phæbetria*, 'The Auk,' 1914, 526–534; (5) Anatomical Notes on the Young of *Phalacrocorax atriceps georgianus*, Sci. Bull. Brooklyn Mus., II, 4, 1914, 95–102; (6) Birds of Fernando Noronha, 'The Auk,' 1915, 41–50; (7) The Atlantic Range of Leach's Petrel, 'The Auk,' 1915, 170–173; (8) The Bird Life of Trinidad Islet, 'The Auk,' 1915, 332–348; (9) The Penguins of South Georgia, Sci. Bull. Brooklyn Mus. II, 5, 1915, 103–133; (10) Notes on American Subantarctic Cormorants, Bull. A. M. N. H., XXXV 1916, 31–48; (11) Two New Diving Petrels, Bull. A. M. N. H., XXXV, 1916, 65–67.